



SEQUENCE LISTING

<110> Lorz, et al.

<120> NUCLEIC ACID MOLECULES WHICH CODE FOR ENZYMES DERIVED FROM WHEAT AND WHICH ARE INVOLVED IN THE SYNTHESIS OF STARCH

<130> 514413-3849

<140> 09/674,817

<141> 2000-11-06

<150> PCT/EP99/03141

<151> 1999-05-07

<150> 19820608.9

<151> 1998-05-08

<160> 11

<170> PatentIn version 3.0

<210> 1

<211> 2997

<212> DNA

<213> Triticum aestivum L. cv. Florida

<220>

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<222> (3)..(296)

<223> exon 1

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<222> (2145)..(2921)

<223> exon 3

<220>

<221> Intron

<222> (297)..(396)

<223> intron 1

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<222> (397)..(1617)

<223> exon 2

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<222> (1618)..(2144)

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Ser Gly Pro Ala Pro Arg Leu Arg Arg Trp Arg Pro Asn Ala Thr

1

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10

15

47

gcg ggg aag ggg gtc ggc gag gtg tgc gcc gcg gtt gtc gag gcg gcg

Ala Gly Lys Gly Val Gly Glu Val Cys Ala Ala Val Val Glu Ala Ala

20

25

30

95

Sequence Listing

acg aag gta gag gac gag ggg gag gag gac gag ccg gtg gcg gag gac Thr Lys Val Glu Asp Glu Gly Glu Glu Asp Glu Pro Val Ala Glu Asp 35 40 45	143
agg tac gcg ctc ggc ggc gcg tgc agg gtg ctc gcc gga atg ccc gcg Arg Tyr Ala Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro Ala 50 55 60	191
ccg ctg ggc gcc acc gcg ctc gcc ggc ggg gtc aat ttc gcc gtc tat Pro Leu Gly Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val Tyr 65 70 75	239
tcc ggc gga gcc acc gcc gcg gcg ctc tgc ctc ttc acg cca gaa gat Ser Gly Gly Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu Asp 80 85 90 95	287
ctc aag gcg gtgggggttc ctcccgagta gagttcatca gctttgcgtg Leu Lys Ala	336
cgccgcgcgc cccttttttg ggcctgcaat ttaagttttg tactggggca aatgctgcag	396
gat agg gtg acc gag gag gtt ccc ctt gac ccc ctg atg aat cgg acc Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu Met Asn Arg Thr 100 105 110	444
ggg aac gtg tgg cat gtc ttc atc gaa ggc gag ctg cac aac atg ctt Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu His Asn Met Leu 115 120 125 130	492
tac ggg tac agg ttc gac ggc acc ttt gct cct cac tgc ggg cac tac Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His Cys Gly His Tyr 135 140 145	540
ctt gat gtt tcc aat gtc gtg gtg gat cct tat gct aag gca gtg ata Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala Lys Ala Val Ile 150 155 160	588
agc cga ggg gag tat ggt gtt cca gcg cgt ggt aac aat tgc tgg cct Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn Asn Cys Trp Pro 165 170 175	636
cag atg gct ggc atg atc cct ctt cca tat agc acg ttt gat tgg gaa Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr Phe Asp Trp Glu 180 185 190	684
ggc gac cta cct cta aga tat cct caa aag gac ctg gta ata tat gag Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu Val Ile Tyr Glu 195 200 205 210	732
atg cac ttg cgt gga ttc acg aag cat gat tca agc aat gta gaa cat Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser Asn Val Glu His 215 220 225	780
ccg ggt act ttc att gga gct gtg tcg aag ctt gac tat ttg aag gag Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp Tyr Leu Lys Glu 230 235 240	828
ctt gga gtt aat tgt att gaa tta atg ccc tgc cat gag ttc aac gag Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His Glu Phe Asn Glu 245 250 255	876

Sequence Listing

ctg gag tac tca acc tct tct tcc aag atg aac ttt tgg gga tat tct Leu Glu Tyr Ser Thr Ser Ser Ser Lys Met Asn Phe Trp Gly Tyr Ser 260 265 270	924
acc ata aac ttc ttt tca cca atg aca aga tac aca tca ggc ggg ata Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr Ser Gly Gly Ile 275 280 285 290	972
aaa aac tgt ggg cgt gat gcc ata aat gag ttc aaa act ttt gta aga Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys Thr Phe Val Arg 295 300 305	1020
gag gct cac aaa cgg gga att gag gtg atc ctg gat gtt gtc ttc aac Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp Val Val Phe Asn 310 315 320	1068
cat aca gct gag ggt aat gag aat ggt cca ata tta tca ttt aag ggg His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu Ser Phe Lys Gly 325 330 335	1116
gtc gat aat act aca tac tat atg ctt gca ccc aag gga gag ttt tat Val Asp Asn Thr Thr Tyr Met Leu Ala Pro Lys Gly Glu Phe Tyr 340 345 350	1164
aac tat tct ggc tgt ggg aat acc ttc aac tgt aat cat cct gtg gtt Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn His Pro Val Val 355 360 365 370	1212
cgt caa ttc att gta gat tgt tta aga tac tgg gtg acg gaa atg cat Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val Thr Glu Met His 375 380 385	1260
gtt gat ggt ttt cgt ttt gat ctt gca tcc ata atg acc aga ggt tcc Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met Thr Arg Gly Ser 390 395 400	1308
agt ctg tgg gat cca gtt aac gtg tat gga gct cca ata gaa ggt gac Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro Ile Glu Gly Asp 405 410 415	1356
atg atc aca aca ggg aca cct ctt gtt act cca cca ctt att gac atg Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro Leu Ile Asp Met 420 425 430	1404
atc agc aat gac cca att ctt gga ggc gtc aag ctc att gct gaa gca Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu Ile Ala Glu Ala 435 440 445 450	1452
tgg gat gca gga ggc ctc tat caa gta ggt caa ttc cct cac tgg aat Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe Pro His Trp Asn 455 460 465	1500
gtt tgg tct gag tgg aat ggg aag tac cgg gac att gtg cgt caa ttc Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile Val Arg Gln Phe 470 475 480	1548
att aaa ggc act gat gga ttt gct ggt ggt ttt gcc gaa tgt ctt tgt Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala Glu Cys Leu Cys 485 490 495	1596
gga agt cca cac cta tac cag gtaagttgtg gcaatacttg taaatgagtt Gly Ser Pro His Leu Tyr Gln 500 505	1647

Sequence Listing

gagtgaatgt cacctggatt ttttatatat accacatgat gatacacatc taaatatata	1707
acaatcatag tgtatgcata tgcatttggc taagaagtat tagtgtatac actagtgcata	1767
tatatagggtt ttaacaccca acttgccaat gaaggaacat agggccttct agttatctta	1827
tttatttgtc cgggtgaataa tccactgaaa aattccagcc atgtcatttt ttaggggggg	1887
agaagaaact atattgattt gccccctaa aagaagccat ctcagaattc ataggtaagt	1947
tgcttttctg taaagaaagg aaaacgactt catactttct atcggtgcta acttagctcg	2007
atgtatatatt gtaagatgaa tgccaaattt aatttgtcgg ataatttgat ctgttattca	2067
caaatttcta tttggtttct ctagaaatca aaccagtaac ttgttattgg cactgcaact	2127
tcttattgat taatcag gca gga gga agg aaa cct tgg cac agt atc aac	2177
Ala Gly Gly Arg Lys Pro Trp His Ser Ile Asn	
510 515	
ttt gta tgt gca cat gat gga ttt aca ctg gct gat ttg gta aca tat	2225
Phe Val Cys Ala His Asp Gly Phe Thr Leu Ala Asp Leu Val Thr Tyr	
520 525 530	
aat aag aag tac aat tta cca aat ggg gag aac aac aga gat gga gaa	2273
Asn Lys Lys Tyr Asn Leu Pro Asn Gly Glu Asn Asn Arg Asp Gly Glu	
535 540 545	
aat cac aat ctt agc tgg aat tgt ggg gag gaa gga gaa ttc gca aga	2321
Asn His Asn Leu Ser Trp Asn Cys Gly Glu Glu Gly Glu Phe Ala Arg	
550 555 560	
ttg tct gtc aaa aga ttg agg aag agg cag atg cgc aat ttc ttt gtt	2369
Leu Ser Val Lys Arg Leu Arg Lys Arg Gln Met Arg Asn Phe Phe Val	
565 570 575 580	
tgt ctc atg gtt tct caa gga gtt cca atg ttc tac atg ggt gat gaa	2417
Cys Leu Met Val Ser Gln Gly Val Pro Met Phe Tyr Met Gly Asp Glu	
585 590 595	
tat ggc cac aca aaa ggg ggc aac aac aat aca tac tgc cat gat tct	2465
Tyr Gly His Thr Lys Gly Gly Asn Asn Asn Thr Tyr Cys His Asp Ser	
600 605 610	
tat gtc aat tat ttt cgc tgg gat aaa aaa gaa caa tac tct gag ttg	2513
Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys Glu Gln Tyr Ser Glu Leu	
615 620 625	
cac cga ttc tgc tgc ctc atg acc aaa ttc cgc aag gag tgc gag ggt	2561
His Arg Phe Cys Cys Leu Met Thr Lys Phe Arg Lys Glu Cys Glu Gly	
630 635 640	
ctt ggc ctt gag gac ttt cca acg gcc aaa cgg ctg cag tgg cat ggt	2609
Leu Gly Leu Glu Asp Phe Pro Thr Ala Lys Arg Leu Gln Trp His Gly	
645 650 655 660	
cat cag cct ggg aag cct gat tgg tct gag aat agc cga ttc gtt gcc	2657
His Gln Pro Gly Lys Pro Asp Trp Ser Glu Asn Ser Arg Phe Val Ala	
665 670 675	
ttt tcc atg aaa gat gaa aga cag ggc gag atc tat gtg gcc ttc aac	2705
Phe Ser Met Lys Asp Glu Arg Gln Gly Glu Ile Tyr Val Ala Phe Asn	

Sequence Listing

680	685	690	
acc agc cac tta ccg gcc gtt gtt gag ctc cca gag cgc gca ggg cgc			2753
Thr Ser His Leu Pro Ala Val Val Glu Leu Pro Glu Arg Ala Gly Arg			
695	700	705	
cgg tgg gaa ccg gtg gtg gac aca ggc aag cca gca cca tac gac ttc			2801
Arg Trp Glu Pro Val Val Asp Thr Gly Lys Pro Ala Pro Tyr Asp Phe			
710	715	720	
ctc acc gac gac tta cct gat cgc gct ctc acc ata cac cag ttc tcg			2849
Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu Thr Ile His Gln Phe Ser			
725	730	735	740
cat ttc ctc tac tcc aac ctc tac ccc atg ctc agc tac tca tcg gtc			2897
His Phe Leu Tyr Ser Asn Leu Tyr Pro Met Leu Ser Tyr Ser Ser Val			
745	750	755	
atc cta gta ttg cgc cct gat gtt tgagagacca atatatacag taaataatat			2951
Ile Leu Val Leu Arg Pro Asp Val			
760			
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<212>	PRT		
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Lys Val Glu Asp Glu Gly Glu Glu Asp Glu Pro Val Ala Glu Asp Arg			
35	40	45	
Tyr Ala Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro Ala Pro			
50	55	60	
Leu Gly Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val Tyr Ser			
65	70	75	80
Gly Gly Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu Asp Leu			
85	90	95	
Lys Ala Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu Met Asn			
100	105	110	
Arg Thr Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu His Asn			
115	120	125	

Sequence Listing

Met Leu Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His Cys Gly
130 135 140

His Tyr Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala Lys Ala
145 150 155 160

Val Ile Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn Asn Cys
165 170 175

Trp Pro Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr Phe Asp
180 185 190

Trp Glu Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu Val Ile
195 200 205

Tyr Glu Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser Asn Val
210 215 220

Glu His Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp Tyr Leu
225 230 235 240

Lys Glu Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His Glu Phe
245 250 255

Asn Glu Leu Glu Tyr Ser Thr Ser Ser Ser Lys Met Asn Phe Trp Gly
260 265 270

Tyr Ser Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr Ser Gly
275 280 285

Gly Ile Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys Thr Phe
290 295 300

Val Arg Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp Val Val
305 310 315 320

Phe Asn His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu Ser Phe
325 330 335

Lys Gly Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys Gly Glu
340 345 350

Phe Tyr Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn His Pro
355 360 365

Val Val Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val Thr Glu
370 375 380

Sequence Listing

Met His Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met Thr Arg
385 390 395 400

Gly Ser Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro Ile Glu
405 410 415

Gly Asp Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro Leu Ile
420 425 430

Asp Met Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu Ile Ala
435 440 445

Glu Ala Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe Pro His
450 455 460

Trp Asn Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile Val Arg
465 470 475 480

Gln Phe Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala Glu Cys
485 490 495

Leu Cys Gly Ser Pro His Leu Tyr Gln Ala Gly Gly Arg Lys Pro Trp
500 505 510

His Ser Ile Asn Phe Val Cys Ala His Asp Gly Phe Thr Leu Ala Asp
515 520 525

Leu Val Thr Tyr Asn Lys Lys Tyr Asn Leu Pro Asn Gly Glu Asn Asn
530 535 540

Arg Asp Gly Glu Asn His Asn Leu Ser Trp Asn Cys Gly Glu Glu Gly
545 550 555 560

Glu Phe Ala Arg Leu Ser Val Lys Arg Leu Arg Lys Arg Gln Met Arg
565 570 575

Asn Phe Phe Val Cys Leu Met Val Ser Gln Gly Val Pro Met Phe Tyr
580 585 590

Met Gly Asp Glu Tyr Gly His Thr Lys Gly Gly Asn Asn Asn Thr Tyr
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Cys His Asp Ser Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys Glu Gln
610 615 620

Tyr Ser Glu Leu His Arg Phe Cys Cys Leu Met Thr Lys Phe Arg Lys

Sequence Listing

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625                630                635                640

Glu Cys Glu Gly Leu Gly Leu Glu Asp Phe Pro Thr Ala Lys Arg Leu
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Gln Trp His Gly His Gln Pro Gly Lys Pro Asp Trp Ser Glu Asn Ser
      660                665                670

Arg Phe Val Ala Phe Ser Met Lys Asp Glu Arg Gln Gly Glu Ile Tyr
      675                680                685

Val Ala Phe Asn Thr Ser His Leu Pro Ala Val Val Glu Leu Pro Glu
      690                695                700

Arg Ala Gly Arg Arg Trp Glu Pro Val Val Asp Thr Gly Lys Pro Ala
      705                710                715                720

Pro Tyr Asp Phe Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu Thr Ile
      725                730                735

His Gln Phe Ser His Phe Leu Tyr Ser Asn Leu Tyr Pro Met Leu Ser
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Tyr Ser Ser Val Ile Leu Val Leu Arg Pro Asp Val
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<213> Triticum aestivum L. cv. Florida

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      by the three exons in SEQ ID NO: 1

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Lys Val Glu Asp Glu Gly Glu Glu Asp Glu Pro Val Ala Glu Asp Arg
35     40     45

Tyr Ala Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro Ala Pro
50     55     60

Leu Gly Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val Tyr Ser
65     70     75     80

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Sequence Listing

Gly Gly Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu Asp Leu
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 Lys Ala Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu Met Asn
 100 105 110
 Arg Thr Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu His Asn
 115 120 125
 Met Leu Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His Cys Gly
 130 135 140
 His Tyr Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala Lys Ala
 145 150 155 160
 Val Ile Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn Asn Cys
 165 170 175
 Trp Pro Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr Phe Asp
 180 185 190
 Trp Glu Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu Val Ile
 195 200 205
 Tyr Glu Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser Asn Val
 210 215 220
 Glu His Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp Tyr Leu
 225 230 235 240
 Lys Glu Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His Glu Phe
 245 250 255
 Asn Glu Leu Glu Tyr Ser Thr Ser Ser Ser Lys Met Asn Phe Trp Gly
 260 265 270
 Tyr Ser Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr Ser Gly
 275 280 285
 Gly Ile Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys Thr Phe
 290 295 300
 Val Arg Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp Val Val
 305 310 315 320
 Phe Asn His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu Ser Phe
 325 330 335
 Lys Gly Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys Gly Glu
 340 345 350
 Phe Tyr Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn His Pro
 355 360 365
 Val Val Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val Thr Glu
 370 375 380
 Met His Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met Thr Arg
 385 390 395 400
 Gly Ser Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro Ile Glu
 405 410 415

Sequence Listing

Gly Asp Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro Leu Ile
 420 425 430
 Asp Met Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu Ile Ala
 435 440 445
 Glu Ala Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe Pro His
 450 455 460
 Trp Asn Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile Val Arg
 465 470 475 480
 Gln Phe Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala Glu Cys
 485 490 495
 Leu Cys Gly Ser Pro His Leu Tyr Gln Ala Gly Gly Arg Lys Pro Trp
 500 505 510
 His Ser Ile Asn Phe Val Cys Ala His Asp Gly Phe Thr Leu Ala Asp
 515 520 525
 Leu Val Thr Tyr Asn Lys Lys Tyr Asn Leu Pro Asn Gly Glu Asn Asn
 530 535 540
 Arg Asp Gly Glu Asn His Asn Leu Ser Trp Asn Cys Gly Glu Glu Gly
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 Glu Phe Ala Arg Leu Ser Val Lys Arg Leu Arg Lys Arg Gln Met Arg
 565 570 575
 Asn Phe Phe Val Cys Leu Met Val Ser Gln Gly Val Pro Met Phe Tyr
 580 585 590
 Met Gly Asp Glu Tyr Gly His Thr Lys Gly Gly Asn Asn Asn Thr Tyr
 595 600 605
 Cys His Asp Ser Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys Glu Gln
 610 615 620
 Tyr Ser Glu Leu His Arg Phe Cys Cys Leu Met Thr Lys Phe Arg Lys
 625 630 635 640
 Glu Cys Glu Gly Leu Gly Leu Glu Asp Phe Pro Thr Ala Lys Arg Leu
 645 650 655
 Gln Trp His Gly His Gln Pro Gly Lys Pro Asp Trp Ser Glu Asn Ser
 660 665 670
 Arg Phe Val Ala Phe Ser Met Lys Asp Glu Arg Gln Gly Glu Ile Tyr
 675 680 685
 Val Ala Phe Asn Thr Ser His Leu Pro Ala Val Val Glu Leu Pro Glu
 690 695 700
 Arg Ala Gly Arg Arg Trp Glu Pro Val Val Asp Thr Gly Lys Pro Ala
 705 710 715 720
 Pro Tyr Asp Phe Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu Thr Ile
 725 730 735
 His Gln Phe Ser His Phe Leu Tyr Ser Asn Leu Tyr Pro Met Leu Ser
 740 745 750

Sequence Listing

Tyr Ser Ser Val Ile Leu Val Leu Arg Pro Asp Val
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51

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Thr Ala Gly Lys Gly Val Gly Glu Val Cys Ala Ala Val Val Glu Val
15 20 25

99

gcg acg aag gcc gag gat gag ggg gag gag gac gag ccg gtg gcg gag
Ala Thr Lys Ala Glu Asp Glu Gly Glu Glu Asp Glu Pro Val Ala Glu
30 35 40

147

gac agg tac gcg ctc ggc ggc gcg tgc agg gtg ctc gcc gga atg ccc
Asp Arg Tyr Ala Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro
45 50 55 60

195

acg ccg ctg ggc gcc acc gcg ctc gcc ggc ggg gtc aat ttc gcc gtc
Thr Pro Leu Gly Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val
65 70 75

243

Sequence Listing

tac tcc ggc gga gcc aca gcc gcg gcg ctc tgc ctc ttc acg cca gaa Tyr Ser Gly Gly Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu 80 85 90	291
gat ctc aag gcg gat agg gtg acg gag gag gtt ccc ctt gac ccc ctg Asp Leu Lys Ala Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu 95 100 105	339
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cag gac atg ctt tac ggg tac agg ttc gac ggc acc ttt gct cct cac Gln Asp Met Leu Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His 125 130 135 140	435
tgc ggg cac tac ctt gat gtt tcc aat gtc gtg gtg gat cct tat gct Cys Gly His Tyr Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala 145 150 155	483
aag gca gtg ata agc cga ggg gag tat ggt gtt ccg gcg cgt ggt aac Lys Ala Val Ile Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn 160 165 170	531
aat tgc tgg cct cag atg gct ggc atg atc cct ctt cca tat agc acg Asn Cys Trp Pro Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr 175 180 185	579
ttt gat tgg gaa ggc gac cta cct cta aga tat cct caa aag gac ctg Phe Asp Trp Glu Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu 190 195 200	627
gta ata tat gag atg cac ttg cgt gga ttc acg aag cat gat tca agc Val Ile Tyr Glu Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser 205 210 215 220	675
aat gta gaa cat ccc ggt act ttc att ggg gct gtg tgc aag ctt gac Asn Val Glu His Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp 225 230 235	723
tat ttg aag gag ctt gga gtt aat tgt att gag tta atg ccc tgc cat Tyr Leu Lys Glu Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His 240 245 250	771
gag ttc aac gag ctg gag tac tca acc tct tct tcc aag atg aac ttt Glu Phe Asn Glu Leu Glu Tyr Ser Thr Ser Ser Ser Lys Met Asn Phe 255 260 265	819
tgg gga tat tct acc ata aac ttc ttt tca cca atg acg aga tac aca Trp Gly Tyr Ser Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr 270 275 280	867
tca ggc ggg ata aaa aac tgt ggg cgt gat gcc ata aat gag ttc aaa Ser Gly Gly Ile Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys 285 290 295 300	915
act ttt gta aga gag gct cac aaa cgg gga att gag gtg atc ctg gat Thr Phe Val Arg Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp 305 310 315	963
gtt gtc ttc aac cat aca gct gag ggt aat gag aat ggt cca ata tta Val Val Phe Asn His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu	1011

Sequence Listing

320	325	330	
tca ttt agg ggg gtc gat aat act aca tac tat atg ctt gca ccc aag Ser Phe Arg Gly Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys 335 340 345			1059
gga gag ttt tat aac tat tct ggc tgt ggg aat acc ttc aac tgt aat Gly Glu Phe Tyr Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn 350 355 360			1107
cat cct gtg gtt cgt caa ttc att gta gat tgt tta aga tac tgg gtg His Pro Val Val Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val 365 370 375 380			1155
acg gaa atg cat gtt gat ggt ttt cgt ttt gat ctt gca tcc ata atg Thr Glu Met His Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met 385 390 395			1203
acc aga ggt tcc agt ctg tgg gat cca gtt aac gtg tat gga gct cca Thr Arg Gly Ser Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro 400 405 410			1251
ata gaa ggt gac atg atc aca aca ggg aca cct ctt gtt act cca cca Ile Glu Gly Asp Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro 415 420 425			1299
ctt att gac atg atc agc aat gac cca att ctt gga ggc gtc aag ctc Leu Ile Asp Met Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu 430 435 440			1347
gtt gct gaa gca tgg gat gca gga ggc ctc tat caa gta ggt caa ttc Val Ala Glu Ala Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe 445 450 455 460			1395
cct cac tgg aat gtt tgg tct gag tgg aat ggg aag tac cgg gac att Pro His Trp Asn Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile 465 470 475			1443
gtg cgt caa ttc att aaa ggc act gat gga ttt gct ggt ggt ttt gcc Val Arg Gln Phe Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala 480 485 490			1491
gaa tgt ctt tgt gga agt cca cac cta tac cag gca gga gga agg aaa Glu Cys Leu Cys Gly Ser Pro His Leu Tyr Gln Ala Gly Gly Arg Lys 495 500 505			1539
cct tgg cac agt atc aac ttt gta tgt gca cac gat gga ttt aca ctg Pro Trp His Ser Ile Asn Phe Val Cys Ala His Asp Gly Phe Thr Leu 510 515 520			1587
gct gat ttg gta aca tat aat aac aag tac aat tta cca aat ggg gag Ala Asp Leu Val Thr Tyr Asn Asn Lys Tyr Asn Leu Pro Asn Gly Glu 525 530 535 540			1635
aac aac aga gat gga gaa aat cac aat ctt agc tgg aat tgt ggg gag Asn Asn Arg Asp Gly Glu Asn His Asn Leu Ser Trp Asn Cys Gly Glu 545 550 555			1683
gaa gga gaa ttc gca aga ttg tct gtc aaa aga ttg agg aag agg cag Glu Gly Glu Phe Ala Arg Leu Ser Val Lys Arg Leu Arg Lys Arg Gln 560 565 570			1731
atg cgc aat ttc ttt gtt tgt ctc atg gtt tct caa gga gtt cca atg			1779

Sequence Listing

Met Arg Asn Phe Phe Val Cys Leu Met Val Ser Gln Gly Val Pro Met	
575 580 585	
ttc tac atg ggt gat gaa tat ggc cac aca aaa ggg ggc aac aac aat	1827
Phe Tyr Met Gly Asp Glu Tyr Gly His Thr Lys Gly Gly Asn Asn Asn	
590 595 600	
aca tac tgc cat gat tct tat gtc aat tat ttt cgc tgg gat aaa aaa	1875
Thr Tyr Cys His Asp Ser Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys	
605 610 615 620	
gaa caa tac tct gac ttg cac cga ttc tgt tgc ctc atg acc aaa ttc	1923
Glu Gln Tyr Ser Asp Leu His Arg Phe Cys Cys Leu Met Thr Lys Phe	
625 630 635	
cgc aag gag tgc gag ggt ctt ggc ctt gag gat ttt cca acg gcc gaa	1971
Arg Lys Glu Cys Glu Gly Leu Gly Leu Glu Asp Phe Pro Thr Ala Glu	
640 645 650	
cgg ctg cag tgg cat ggt cat cag cct ggg aag cct gat tgg tct gag	2019
Arg Leu Gln Trp His Gly His Gln Pro Gly Lys Pro Asp Trp Ser Glu	
655 660 665	
aat agc cga ttc gtt gcc ttt tcc atg aaa gat gaa aga cag ggc gag	2067
Asn Ser Arg Phe Val Ala Phe Ser Met Lys Asp Glu Arg Gln Gly Glu	
670 675 680	
atc tat gtg gcc ttc aac acc agc cac tta ccg gcc gtt gtt gag ctc	2115
Ile Tyr Val Ala Phe Asn Thr Ser His Leu Pro Ala Val Val Glu Leu	
685 690 695 700	
ccg gag cgc aca ggg cgc cgg tgg gaa ccg gtg gtg gac aca ggc aag	2163
Pro Glu Arg Thr Gly Arg Arg Trp Glu Pro Val Val Asp Thr Gly Lys	
705 710 715	
cca gca cca tac gac ttc ctc act gac gac tta cct gat cgc gct ctc	2211
Pro Ala Pro Tyr Asp Phe Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu	
720 725 730	
acc ata cac cag ttc tct cat ttc ctc aac tcc aac ctc tac ccc atg	2259
Thr Ile His Gln Phe Ser His Phe Leu Asn Ser Asn Leu Tyr Pro Met	
735 740 745	
ctc agc tac tca tcg gtc atc cta gta ttg cgc cct gat gtt tga	2304
Leu Ser Tyr Ser Ser Val Ile Leu Val Leu Arg Pro Asp Val	
750 755 760	
gaggcggata tacagtaaataaatatgtata tatgtagtcc tttggcgtat tatcagtgtg	2364
cacaattgct ctattgccaa tgatctattc gatccacaga tacatgtgca aaaaaaaaaa	2424
aaaaaaaaactc gag	2437
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<212> PRT	
<213> Triticum aestivum L. cv. Florida	
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Pro Ala Pro Arg Leu Arg Arg Trp Arg Pro Asn Ala Thr Ala Gly Lys	
1 5 10 15	

Sequence Listing

Gly Val Gly Glu Val Cys Ala Ala Val Val Glu Val Ala Thr Lys Ala
 20 25 30

Glu Asp Glu Gly Glu Glu Asp Glu Pro Val Ala Glu Asp Arg Tyr Ala
 35 40 45

Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro Thr Pro Leu Gly
 50 55 60

Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val Tyr Ser Gly Gly
 65 70 75 80

Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu Asp Leu Lys Ala
 85 90 95

Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu Met Asn Arg Thr
 100 105 110

Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu Gln Asp Met Leu
 115 120 125

Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His Cys Gly His Tyr
 130 135 140

Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala Lys Ala Val Ile
 145 150 155 160

Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn Asn Cys Trp Pro
 165 170 175

Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr Phe Asp Trp Glu
 180 185 190

Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu Val Ile Tyr Glu
 195 200 205

Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser Asn Val Glu His
 210 215 220

Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp Tyr Leu Lys Glu
 225 230 235 240

Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His Glu Phe Asn Glu
 245 250 255

Leu Glu Tyr Ser Thr Ser Ser Ser Lys Met Asn Phe Trp Gly Tyr Ser

Sequence Listing

260	265	270
Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr Ser Gly Gly Ile 275 280 285		
Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys Thr Phe Val Arg 290 295 300		
Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp Val Val Phe Asn 305 310 315 320		
His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu Ser Phe Arg Gly 325 330 335		
Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys Gly Glu Phe Tyr 340 345 350		
Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn His Pro Val Val 355 360 365		
Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val Thr Glu Met His 370 375 380		
Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met Thr Arg Gly Ser 385 390 395 400		
Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro Ile Glu Gly Asp 405 410 415		
Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro Leu Ile Asp Met 420 425 430		
Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu Val Ala Glu Ala 435 440 445		
Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe Pro His Trp Asn 450 455 460		
Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile Val Arg Gln Phe 465 470 475 480		
Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala Glu Cys Leu Cys 485 490 495		
Gly Ser Pro His Leu Tyr Gln Ala Gly Gly Arg Lys Pro Trp His Ser 500 505 510		

Sequence Listing

Ile Asn Phe Val Cys Ala His Asp Gly Phe Thr Leu Ala Asp Leu Val
515 520 525

Thr Tyr Asn Asn Lys Tyr Asn Leu Pro Asn Gly Glu Asn Asn Arg Asp
530 535 540

Gly Glu Asn His Asn Leu Ser Trp Asn Cys Gly Glu Glu Gly Glu Phe
545 550 555 560

Ala Arg Leu Ser Val Lys Arg Leu Arg Lys Arg Gln Met Arg Asn Phe
565 570 575

Phe Val Cys Leu Met Val Ser Gln Gly Val Pro Met Phe Tyr Met Gly
580 585 590

Asp Glu Tyr Gly His Thr Lys Gly Gly Asn Asn Asn Thr Tyr Cys His
595 600 605

Asp Ser Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys Glu Gln Tyr Ser
610 615 620

Asp Leu His Arg Phe Cys Cys Leu Met Thr Lys Phe Arg Lys Glu Cys
625 630 635 640

Glu Gly Leu Gly Leu Glu Asp Phe Pro Thr Ala Glu Arg Leu Gln Trp
645 650 655

His Gly His Gln Pro Gly Lys Pro Asp Trp Ser Glu Asn Ser Arg Phe
660 665 670

Val Ala Phe Ser Met Lys Asp Glu Arg Gln Gly Glu Ile Tyr Val Ala
675 680 685

Phe Asn Thr Ser His Leu Pro Ala Val Val Glu Leu Pro Glu Arg Thr
690 695 700

Gly Arg Arg Trp Glu Pro Val Val Asp Thr Gly Lys Pro Ala Pro Tyr
705 710 715 720

Asp Phe Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu Thr Ile His Gln
725 730 735

Phe Ser His Phe Leu Asn Ser Asn Leu Tyr Pro Met Leu Ser Tyr Ser
740 745 750

Ser Val Ile Leu Val Leu Arg Pro Asp Val
755 760

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18

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33